

Fig. 1a

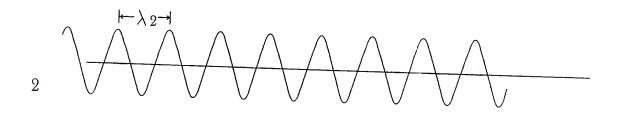


Fig. 1b

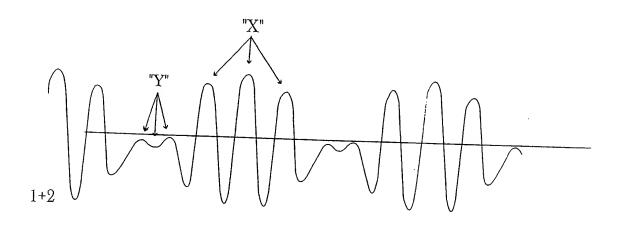


Fig. 1c

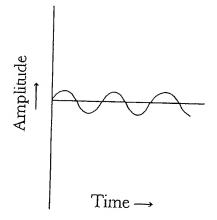


Fig. 2a

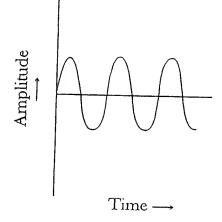


Fig. 2b

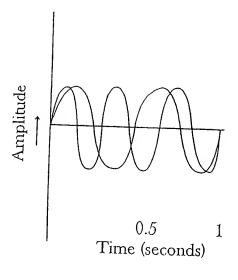


Fig. 3a

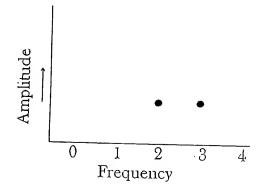


Fig. 3b

Initial 400 $400 + 100 = 500$ $500 + 300 = 800$ $800 + 200 = 1000$	al Frequencies and and and and	(Hz) 100 400 - 100 = 300 500 - 300 = 200 800 - 200 = 600
1000 + 600 = 1600	and	1000 - 600 = 400
Sum (Added) Frequencies (Hz) 400 500 800 1000 1600 2000 3200	Difference	(Subtracted) Frequencies (Hz) 100 300 200 600 400 1200 800

Fig. 4

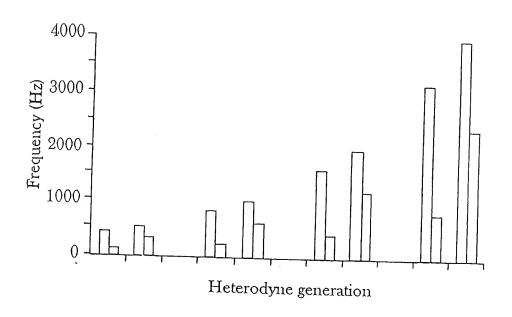
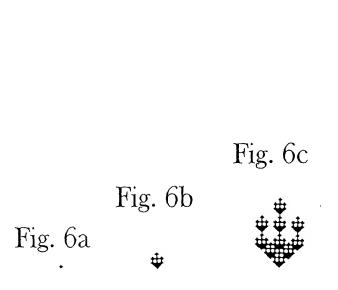


Fig. 5

Fig. 6d





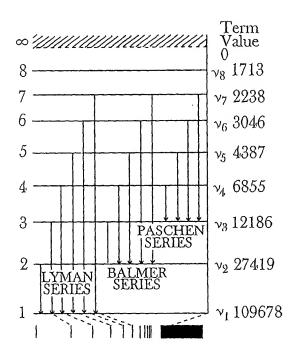
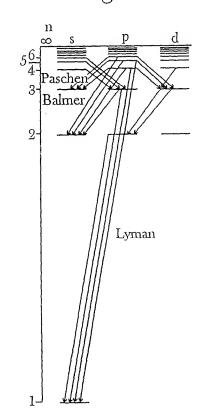
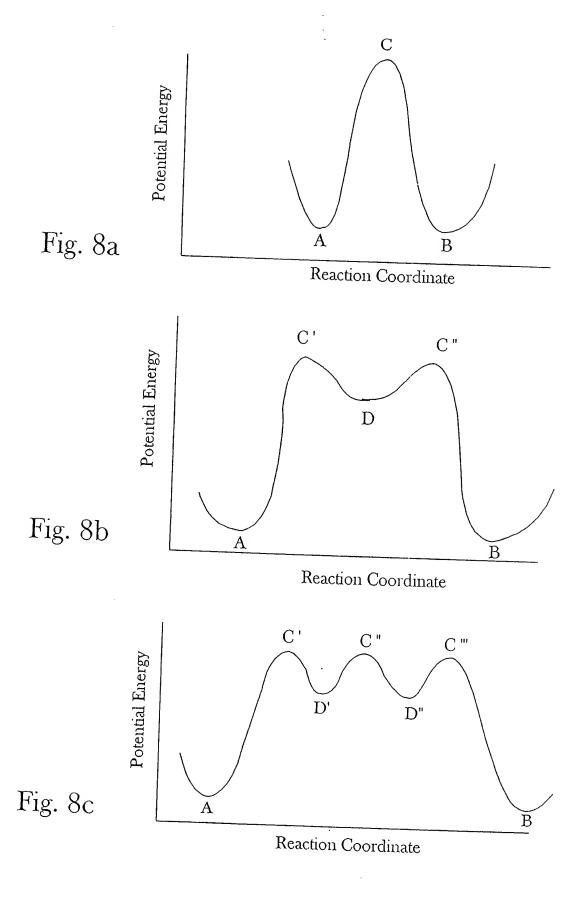


Fig. 7b





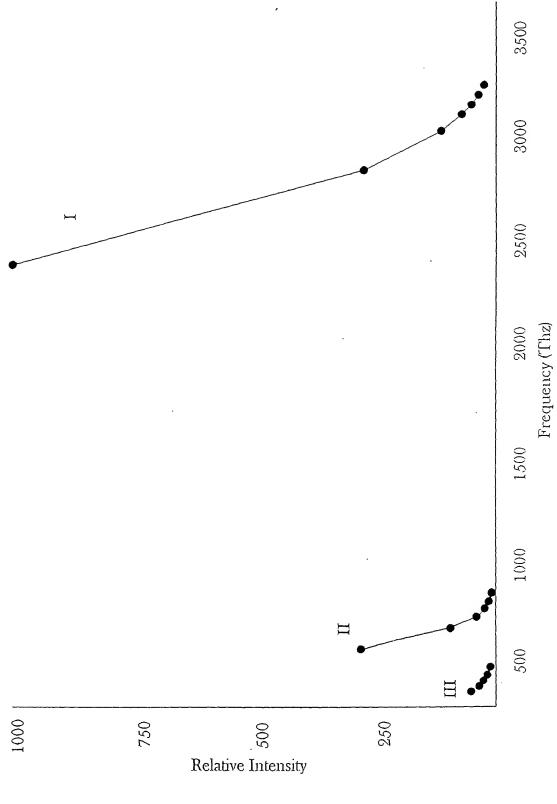


Fig. 9a

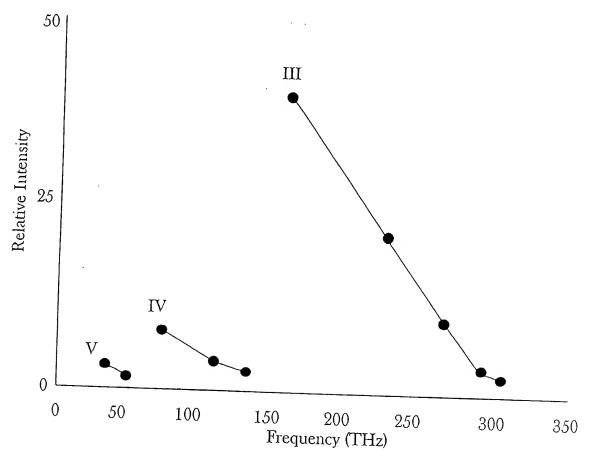
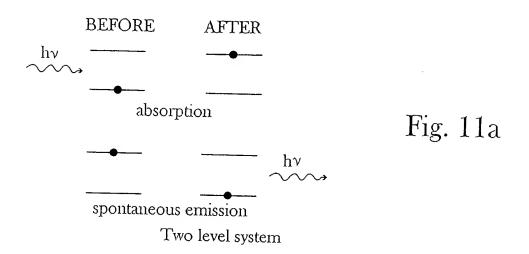


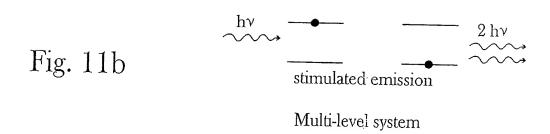
Fig. 9b

Frequency Curves - THz (relative intensity)

V	IV	III	II	I
40 (6) 64 (4)	74 (15) 114 (8) 138 (5)	160 (40) 234 (20) 274 (12) 298 (7) 314 (5)	456 (300) 616 (80) 690 (30) 731 (15) 755 (8) 770 (6) 781 (5)	2466 (1000) 2923 (300) 3082 (100) 3156 (50) 3196 (30) 3220 (20) 3236 (15)

Fig. 10





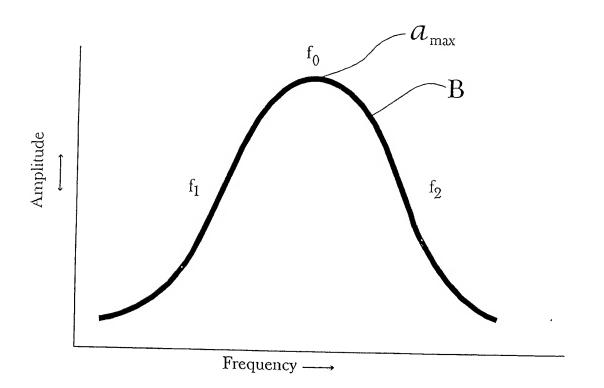
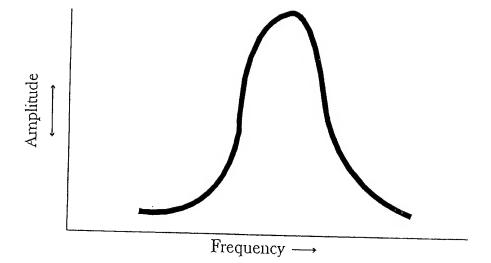


Fig. 12



Resonance curve with high Q $Fig. \ 13a$

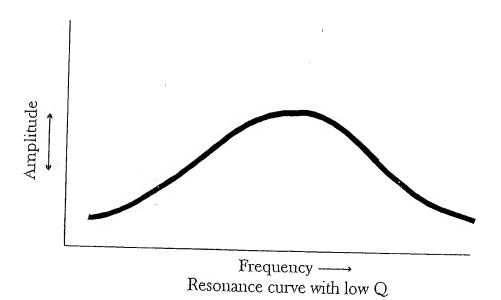
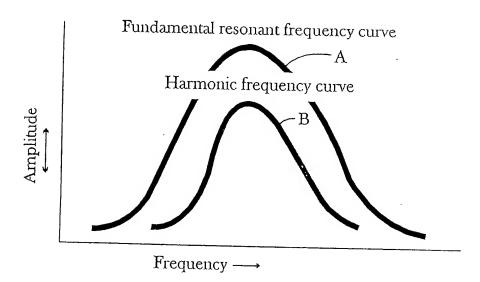
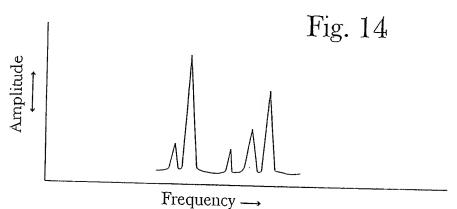


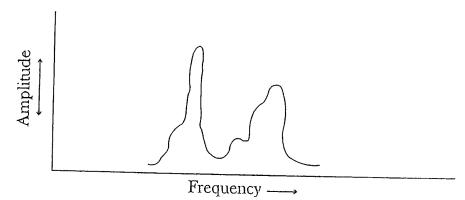
Fig. 13b





Spectral pattern at low temperature

Fig. 15a



Spectral pattern at moderate temperature

Fig. 15b

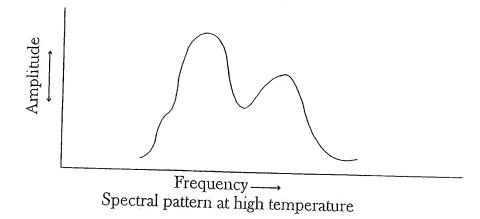


Fig. 15c

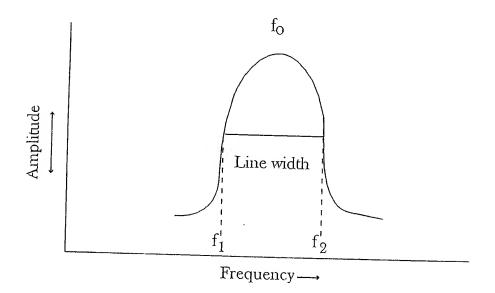
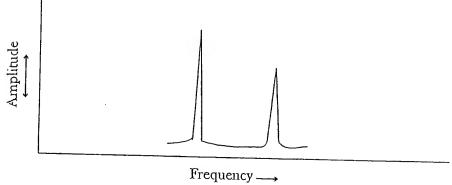
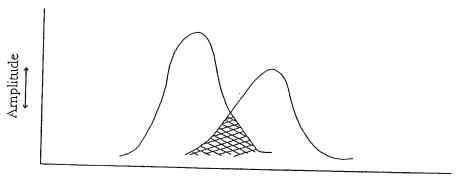


Fig. 16



Separate and distinct spectral curves at low temperature

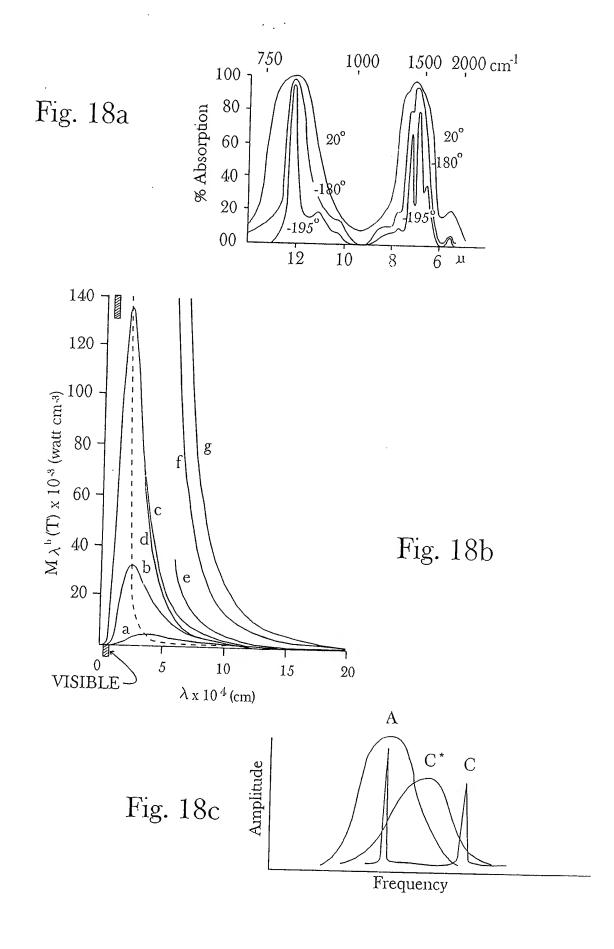
Fig. 17a

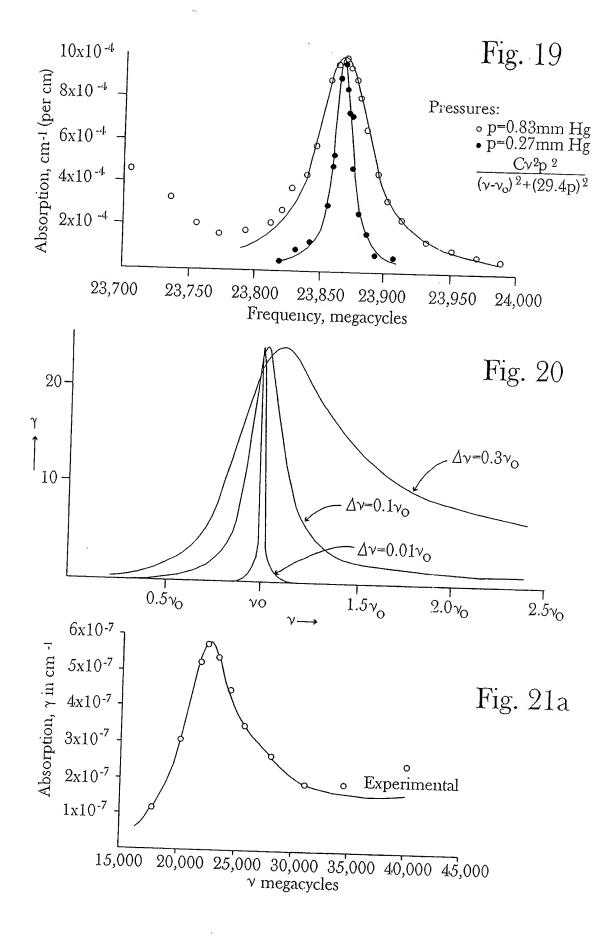


Frequency ____

Overlapping spectral curves at higher temperature, allowing resonant energy transfer

Fig. 17b





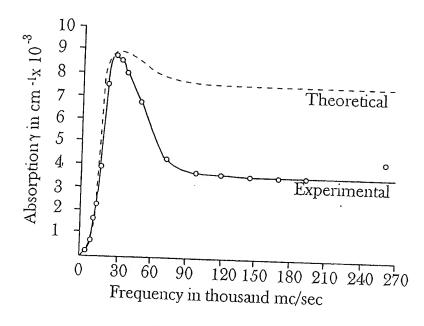
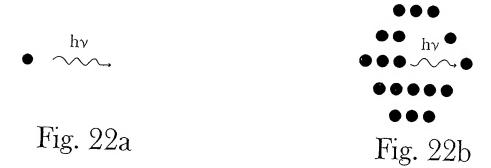


Fig. 21b



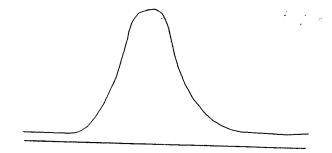


Fig. 23a

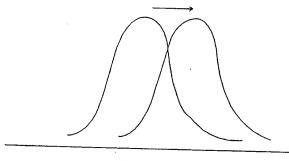


Fig. 23b

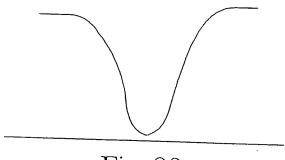


Fig. 23c

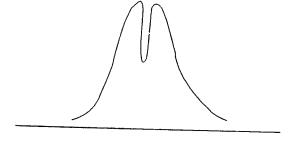
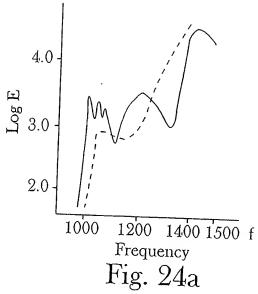


Fig. 23d



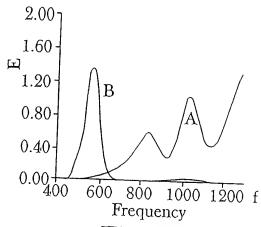


Fig. 24b

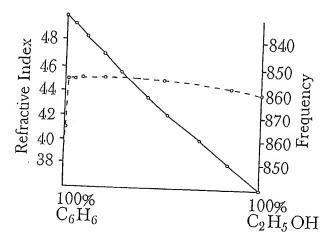


Fig. 24c

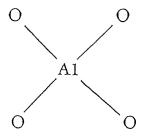


Fig. 25a

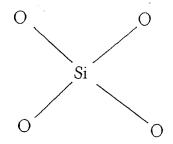
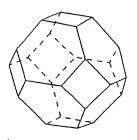
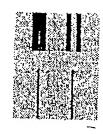


Fig. 25a





- OxygenAluminum or silicon

Fig. 26a

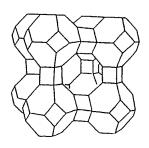


Fig. 26b

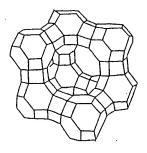


Fig. 26c

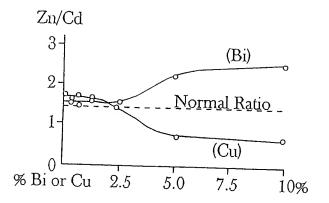
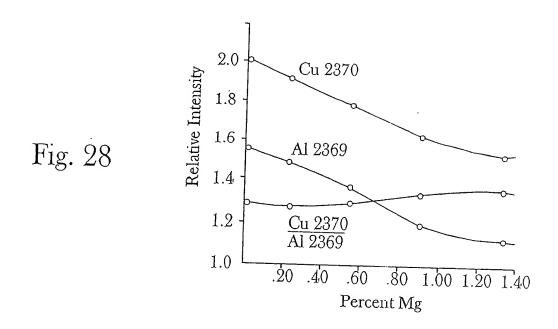


Fig. 27



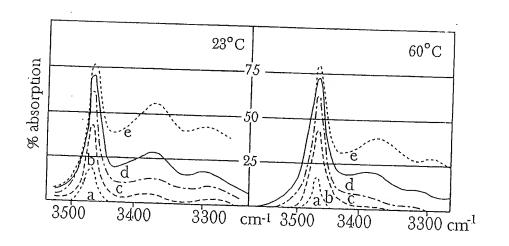


Fig. 29

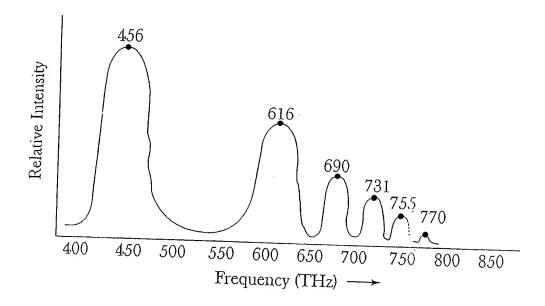
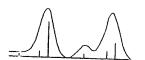
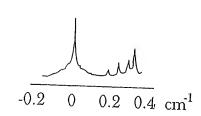


Fig. 30a



Emission spectrum
T = 50K
Fig. 30b



 $\begin{array}{c} \text{High resolution spectrum} \\ \text{Fig. 31} \end{array}$

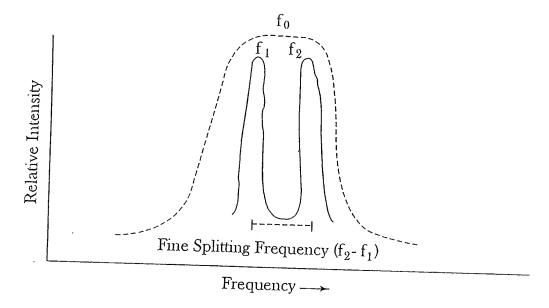


Fig. 32

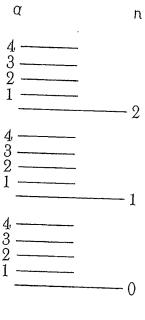
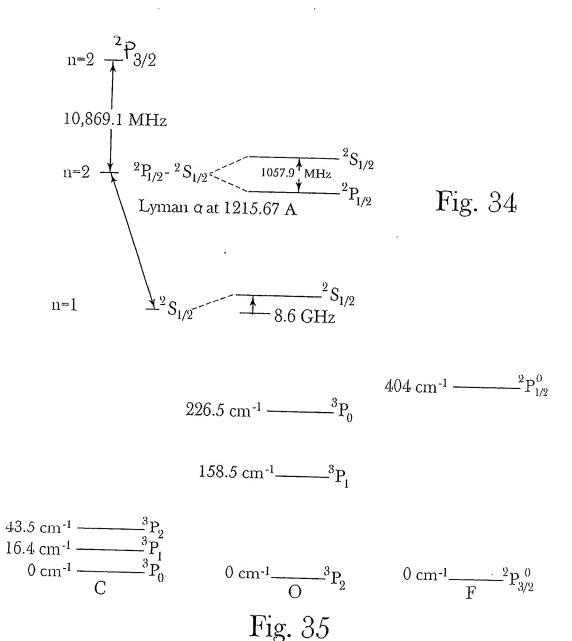
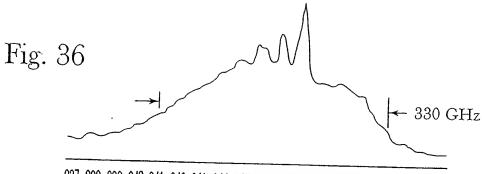
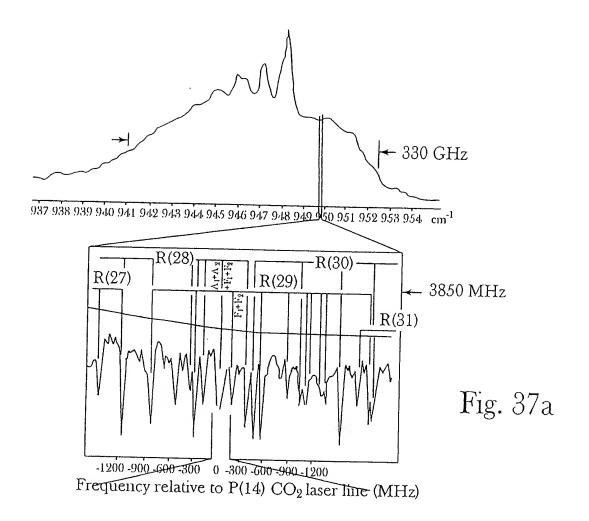


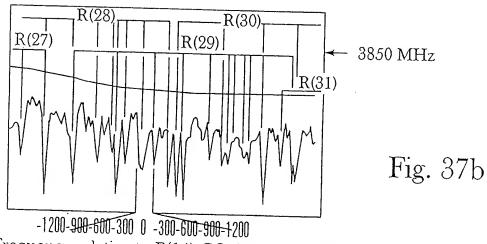
Fig. 33





937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 $\,\mathrm{cm}^{-4}$





Frequency relative to P(14) CO₂ laser line (MHz)

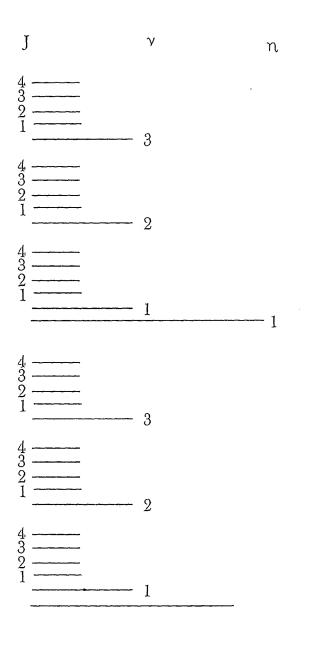
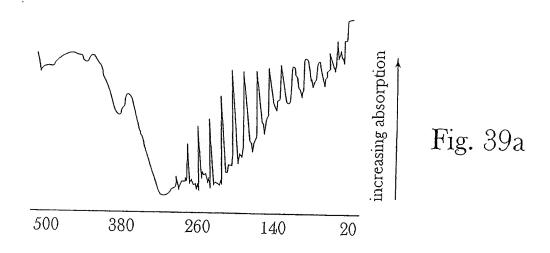
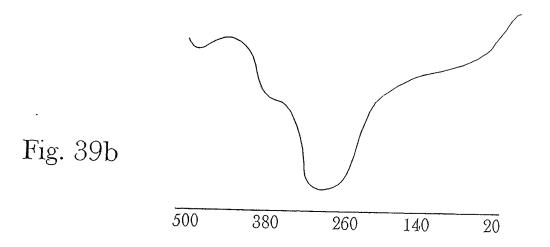
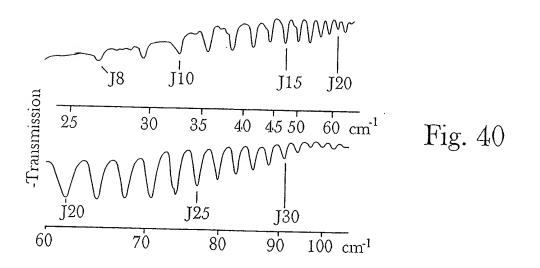


Fig. 38







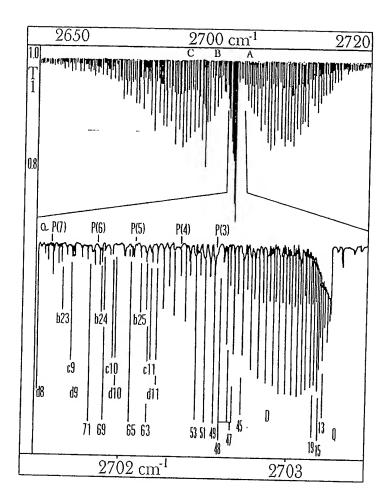
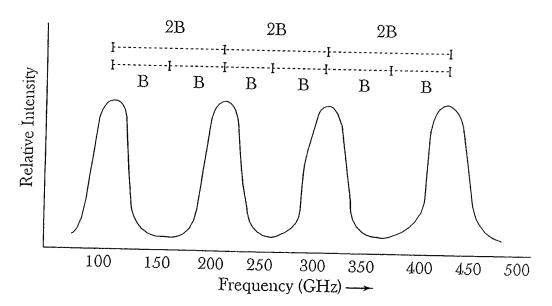


Fig. 41

Fig. 42



Rotational and Vibrational F	requencies for LiF
------------------------------	--------------------

Rotation Transiti				
$0 \rightarrow 1$	89,740.46	88,319.18	86,921.20	
1→2	179,470.35	176,627.91	173,832.04	171,082.27
2 → 3	269,179.18	264,915.79	260,722.24	256,597.84
3 →4.	358,856.19	353,172.23	347,581.39	342,082.66
$4 \rightarrow 5$	448,491.07			
Vibratio Level	nal 0	1	. 2	3

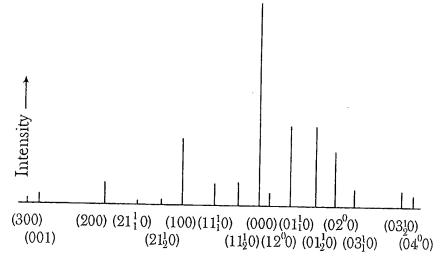
Fig. 43a

Rotational and Vibrational Frequencies for LiF

Differences Between Rotational And Vibrational Frequencies (MHz) For LiF

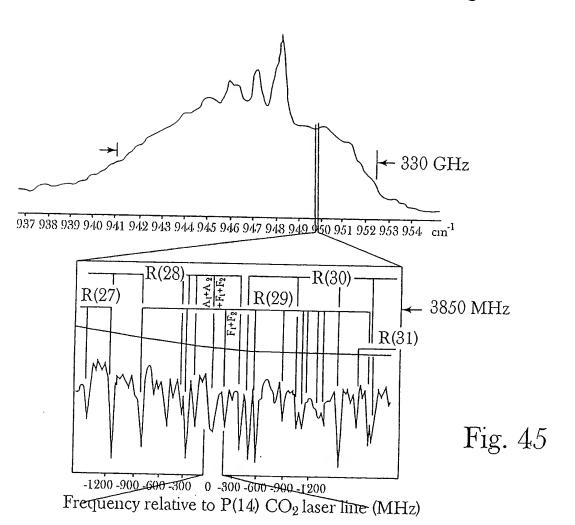
Rotatio Transiti				
0→1	1,421.28	1,397.98		
1→2	2,842.44	2,795.87	2,749.77	
2→3	4,263.39	4,193.55	4,124.40	
3→4.	5,683.96	5,590.84	5,498.73	
4→5	7,104.24			
Vibratio Level	nal 0	1	2	3

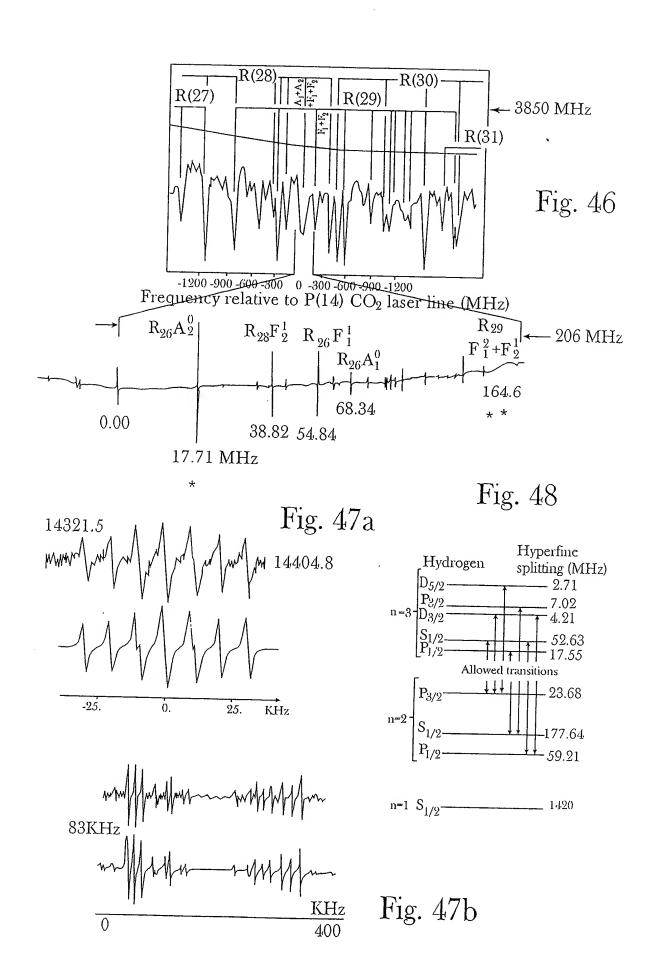
Fig. 43b

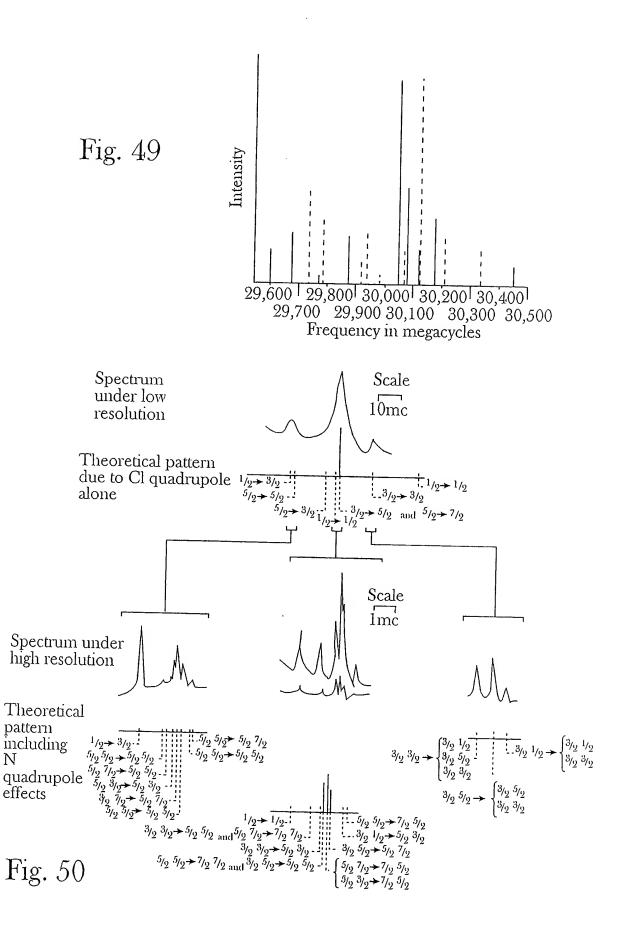


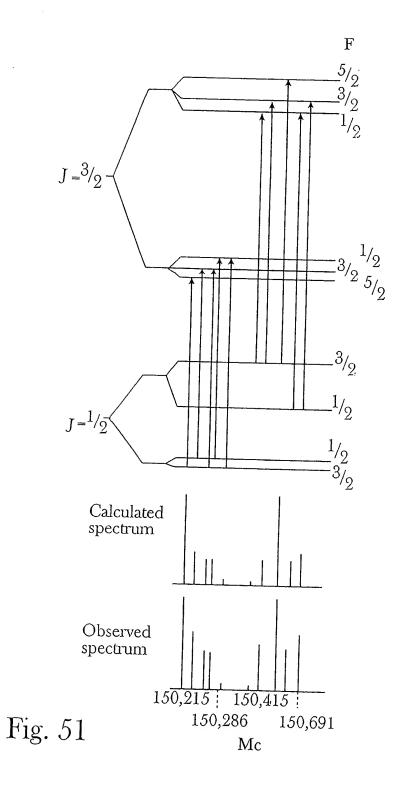
Frequency ----

Fig. 44









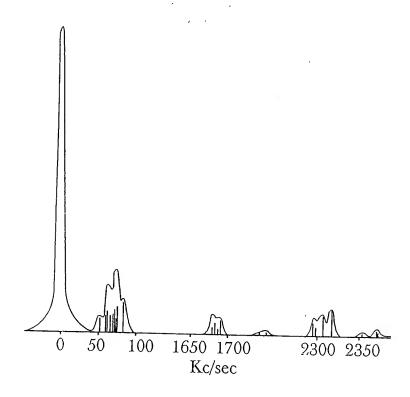
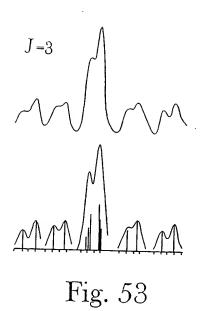


Fig. 52



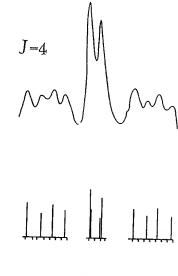
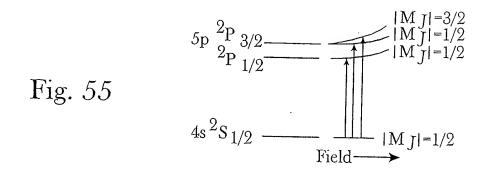
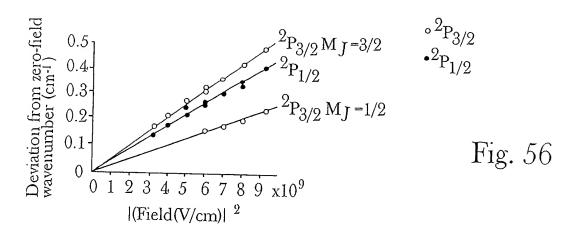
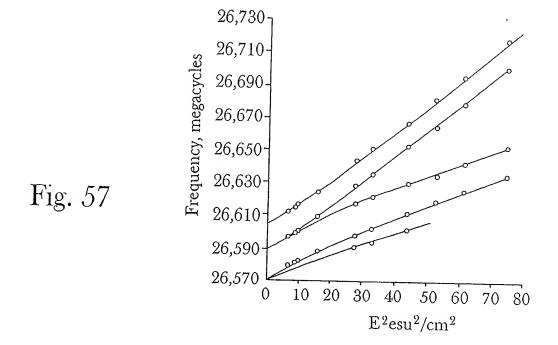


Fig. 54







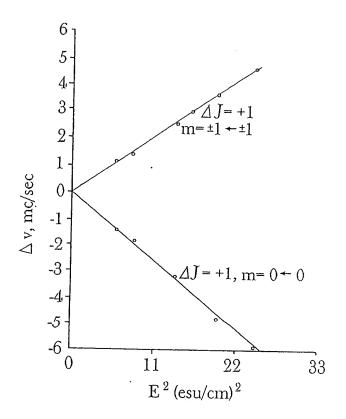


Fig. 58

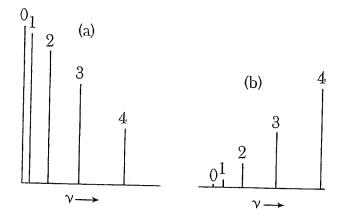
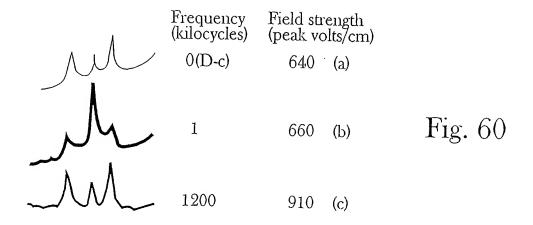


Fig. 59



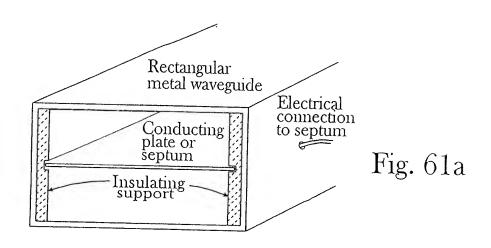
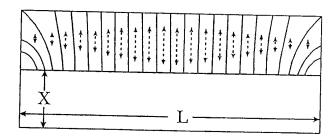
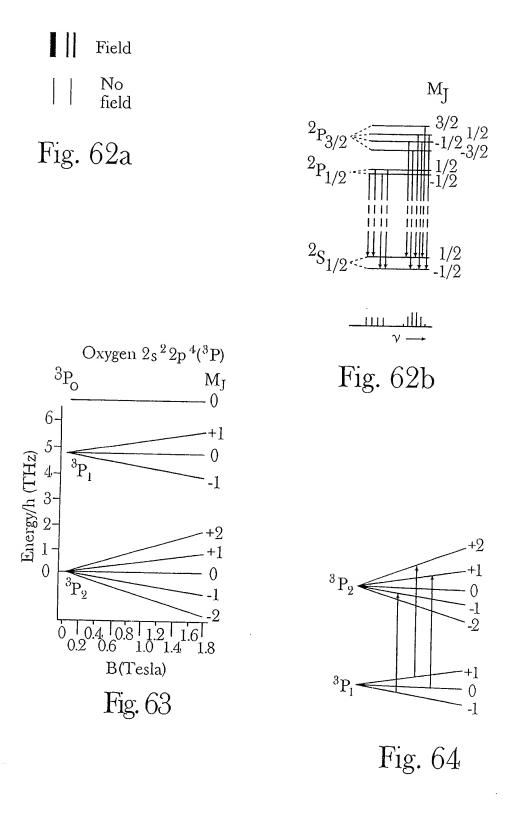
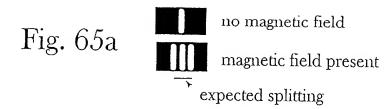


Fig. 61b







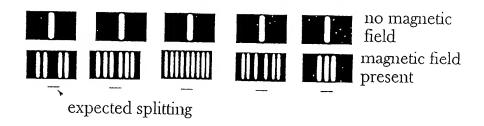


Fig. 65b

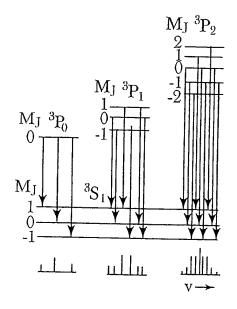


Fig. 66

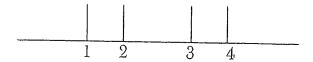


Fig. 67a

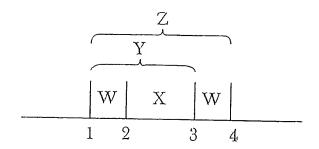
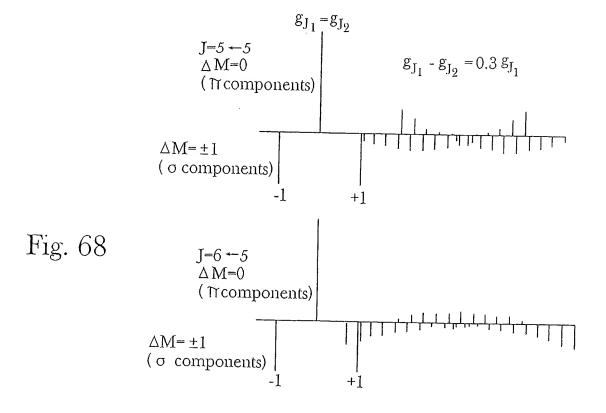


Fig. 67b



100	7.7144	10,786			4.2382	40.19	385 64.	4367	74.00	16	114.2	138.4	128	159.881	233.81	92 [274.081	298.3	ia 1	011067	
364.501 421.428	0	1 0		0	0			0	0		0	1.54.	0	0	133,01	+	214.001	230.3	19	314 051	456811
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Fig. 69a

1018 75 1023 26 1026 2 1026 2 1026 92 1028 96 1029 42 1031 57 1034 53 1035 96 1037 99 1050 76 1050 75 1050 23 1063 75 1063 75	0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0	0 0 0		138.428 0 0 0	159,881 (Ū	0	298.319 0 0	0	456 811
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1028.96 1029.42 1031.67 1034.53 1035.96 1036.19 1037.99 1050.76 1057.58 1059.23 1063.75 1067.44 1063.45	0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0	0 0 0 0	0	0	8,99229							L (
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1223.16	0 0	0	0	0	0	0	0	0	0	0	0	0	0	0
1228 63	0 0	Ö	- 0	- 0 -	0	0	0	0	0	0	0	0	0	0
1230 33	0 0	0	0	0	0	- 5	0		0		0	8	0	0
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1234.71		0	0	0	0	0	0	0	0	0	0	0	0	0
123981	0 0		- 0	- 0	- 0	- 0	0	0	0	0	8	0	0	0
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1271.87	0 0	0	0	0	0	Ò		- il		0			-0	0

Fig. 69b

100	7,7144	10786	15,732	24.2382	40,1985	61 (202]	3 (00 to 1								
1281 07	7.7.11	10708	13.132	24.230Z	40.1303 D	64.4367	74.0016	114.2	138,438	159.881	233,882	274.081	298,319	314.051	456,811
1288 82			<u>i</u> _			200012		!		0	0	0		0	n n
1293 16				0		200013	0			0	0	Ô	0	Õ	å
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	<u>U</u>	0	U	0	0	0	0	0	0	1	0	0	0		
1307 77	<u>V</u>	0		0	0	0	0	0		0	6			- 6	
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147635	0 _		0_		0		0	-	- 1				- U	0	U
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Fig. 69c

100	456,816	616,638	690 691	730831	755,131	770863	781,649	2466	1 2022	1021	2152 [2162	
364501 421428	0	0	0	0	0	77003	101,043	1 110	7923	.1083	3157 3197	3221 32367
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443 479	0	Ō	j	1 0	0	1	. 8	0	0	0	0 0	0 0
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474478		9		0	0	0	0	0	0	1	0 0	
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573474	0		0	0	0	0	0	1	0	0	0 0	0 0
592 536 594 35	0		-0	0	0	0	0	0	0	0	0 0	0 1 0 1
614 388		0 99627	0		0	0	- 0	0	1		0 0	0 0
658 534	0	B	v	Ü	Ö		- 0 1	1	0	-11	0 0	0 0
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759 276	0	0	0	0	1.00549	- 0	- 0	0	0	0	0 0	0
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768 555 785 066	0	0		0	0	0 99701	0	0	Ö	ĭ	 	0 0
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874 558	0	0	0		<u>i</u> -	-il	- il-		- 1	0	0 0	0 0
879 6:19 901 957	0	0	0	0	0	ð	0	0	_	Ö	0 0	0 0
904 338	- 0	0	0	0	0		0	0	0	0	8 0	0 0
907 95	0	- 		- 0	0		- 0	- !	0	0	0 0	0 0
911 167	1,99459	0		0	0		-	0	0	0	0 0	0 0
913453	2 0079		0		0	Ŋ.	0	-	-	0	0 0	0 0
920761	7110/9	0	0	0	0	0	0	0	()	0	0 0	6 6
921 877	- "	0		0	0	0		0	0	0	0 0	0 0
922 336	0	- 1	0		0	- 0	0	0	0	0	0 0	0 0
927 168	0	0	0	8	- 1		0	0	0	0	0 0	0 0
928 067	0	- 0	0	0	Ü		- 1			#+	0 0	0 0
935 67	0	0			0	0	0	0	0	0	0 0	0 0
949744		0	0	0	0		0	0	0		0 0	0 0
954 939	0	0	0	- i l	- "	0	0	-	0	0		0 0
967.06	0	0	0	0	Ū.	_ 	-	0		0	0 0	0 0
975.906 978.208	0	0	0	U	R	U	Ö	0			0 0	0 0
985.384	0	0	0	0	0	0	0	0			0 0	0 0
98/312	-	 	0	0	0	0	0	0	0	0	0 0	0 0
993 388	0	0	0	8	0	0	0	0			0 0	0 0
998553	0	0	0	0	0	- 0	- 0	0			0 0	0 0
939 985	1	0	0	0	0	Ŏ.	0	8			0 0	0 0
1912.56 1013.12	0	0	0	0	0	0	0	0			0 0	0 0
1018/06	0	0	- 0	- 1	0	D	0	0			0 0	
1979 (0)			0	a	- []	n]	0	9	0		0 0	0 0

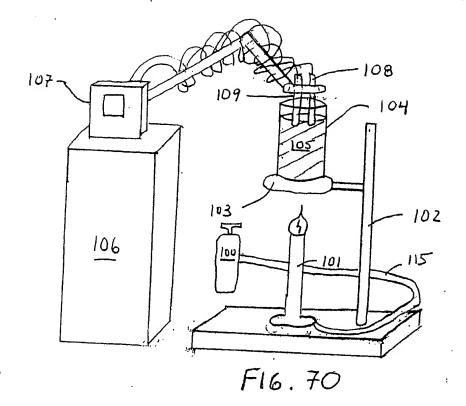
Fig. 69d

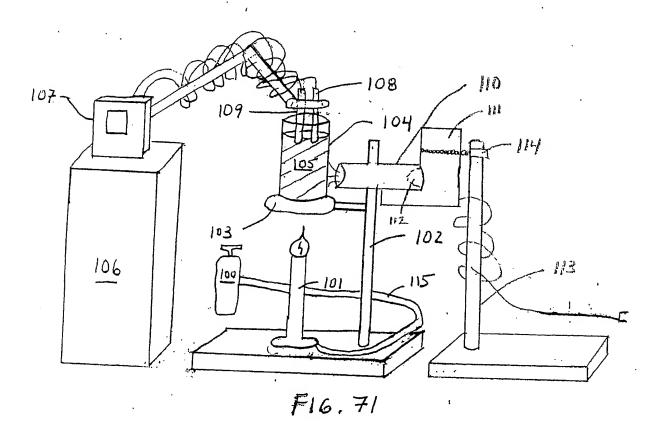
100	156 816	616,688	630,691	730891	755,131	770.863	-391 eta	T ales	0.00					
101875	0	0	0	1.003)	133,131	//0.86J	781.649 0	2466	2923	3083	3 57	3197	3221	3236,7
1023 26	0	0		- 0						0	0	- 0	0	0
1026.92	0			0	0	1	ij	0	0		- 0	0	1	0
1028 95	0	0	0		0	0	f	0	0	0	0		1	0
1029 42	0	. 0	0	0	0	0 [0	0	0	0	0	0	0	0
1031 67	0	0	Ö	Ö	0	0	0	0	- 1	0	0	0	0	0
103453 1035 96	0	0		0	a	Ö	j,	·	O	0	0	0	0	0
1036 19	9	9		0		0	0	0	Ö	Ŏ	ő	0	0	0
1037 99	0	C	i		0	0	0	0	0	0	0	0	0	0
105076	0	0		8	Ů	0	0	0	- 8	0	0	-0	- 0	0
1057.58	0	0	0	- 0	0	0	0	Ŏ	0	il			0	0
1063 75	- il		- 0	- 0	0	0	8	0	0	0	0	0	Ď	0
1867.44	0	0		ě	- 61	- 1		- 1		- 8	_ 0	- 01		0
10/3 27	8	0	0	0	0		Ö	- 0	0	-0	"	- 0	0	0
1030.72		0	0	0	- 0		0	0	C,	0	1	öf		0
1081.02	1	0	0		0	0	0	0	6	0	0	0	0	1
1031 63	0	0				0	0	- 0	01-	0	0	0	0	0
108235	0	0	0	0	0	0	0	0	- 01	0	0	0	0	0
1088 21 1088 63	8	0	0	0	0	0	0	- 0	0	0	-01	- 0	0	0
1000.03		- 0	0		0	0	- 1	0	Ö	i i	0	- 0	0	0
109474	ij	0		0	0	- 0	0	0	0 j	0	0	0	0	0
109655	0	0	0	Û		- 0	- 0	0	- 61	8	0	0	0	0
1098.17	0	0	0	0	0	0	0	0	0	-	-0	0	0	0
1104 97 1107 93	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0		0	- 7	9	0		- 0	0	9	9		6	0
1110936	0	0	0	0	0	0	Ö	öl	ö		-	0	- 0	0
111982	;;	0	0		0	0	0	0	Û	Ō	0	0	0	- 1
11203	Ö	6		- 0	- 0	0	- 0	0	0	0	0	0	0	0
1127 27	0	0	0	Ö			0	- 0	0	0	0	0	0	0
1127 82	0	0	0		0	9	ŏ	-	- 0	0	-01-	0	0	- 1
113262	- 6	0	0	0	0	- 0	0	0		j	0	il	-il-	
113586	0	0	0	0	0	0	0	0	0	0	0	0	0	0
114075	0	0	0	_ i	- il		- 0	0	0		0	-	! _	0]
114443	0	0	0		- 0	i	ŏ -			0	0		0	0
1154.82	0	0	0		0	0	0	0	0	i	- O	-01-	0	0
117162		- -	0	0	0	0	0	0	0	0	0	0	il	01
1175 91	0	Ö	0	- 1		0	0	0	0	0	0	0	0	0
118066	0	0	0	0	ı i	- i	0		0	0	0	0	- 0	0
1181.92	-0	G (- 0	0	0	. ()	0	0	1	il-	0	0	0	0
1187.63	0	0	0	0	8	0	0	0	0	0	0	0	- 1	-01
119174	Ö	- 0	1	- 6	0	-1-	- 0	0	0		0	0	0	Ō
1192	0	0	0	0	0	0	0	0	0	0	0	-01-	0	0
119246	0	- 8	0	0	0			0	0	0	-	0	-0 -	0
119511	0	0	0	0	0	0	8	0	 	0	0	0	0	0
119989	- 0	- 0	0	0	0	0	0	0	0	0	Ö	0	- 0	0
120118	0	0	Ď	0	ő	0	0	0	0	0	0	0	0	
1203 93	0	0	0	0	0	0	Ö	0	0	0	0	0	0	0
1213 24		∦	0	-		0	0	0	A	8	i 	 	0	
1214 99	0	O O	0	ő	8	0	0	0	0	0	0	0	0	0
1229 63	0	1.9323	0	0	0	0	Ō	0	 	0	0	0	0	
1230.33	-0	99506		0	0	-0	P	0	0	0	0	1	0	0
123417	0 2	00129	0	0	Ö	0	0	0	0		0	0		1
123463		00203	0	0	0	0	ij					0	0	0
123981	- 0 - 4	00216	0	0	0	0	0	0	0		n	0	0	- 0
1247 53			0	0	0	0	0	0	0	0	0	0	0	
1248 16	1	0	0	0	0	0	0					n	0	
1251 13	0	0	0	0	0	0	0					0	0	0
1254 61 1256 04	0	0	0	0	Ü	0						0	0	0
125771	0	0	0	0	1	D	ñ .					0	0	0
1265,87			0	0	0	0	0	0	0	0 1		0	1	0
1271,87	0	0	0	0	0	0	0			0 0)	0	0
							0	0	0		<u></u>		0	0

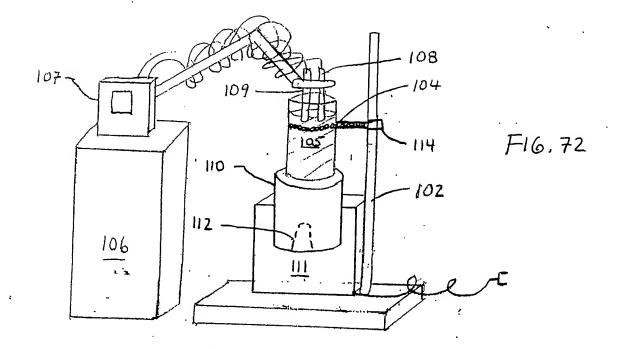
Fig. 69e

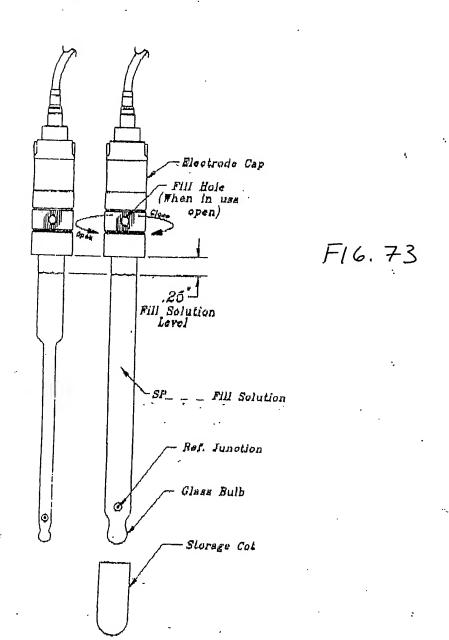
100	456816	G16.688	690,691	730891	755,131	770863	781,649	2466	2923	3093	3157	3197	3221	12367
1281 07	0	0		0	0	0	0	0	-	0	. 0	0	0	0
1288.87	Ü	0	0	0	0	0	Q	0	0	0	0	0	0	0
1293,16	8	()		, I	8	8	0	8	0	0	ß	0	8	(1
129472	n	0	8	1)	0	Ŋ.	0	1	0	0	1	0	Ŋ	B
1298 91	0	0	f	0	6	0	0	0	0	0	0	0	0	0
130777	0	8	0	0	0	0	Q	0	0	0	0	C	-	0
1309 56	B	0		9	8	0	0	0	0	8	8	8	Ó	8
1318,13	0	0	0	0	9	0	0	0	0	1	- 8	0	0	0
1321.35	1	0	0		8	0	0	9	0	0	9	Û	0	0
133283	0	Q		0:	0		0	0	0	9	0	0	0	0
1348 83	0	0		1		0	8	P	8	0	8		0	0
1361 32	0	8	1		8	0	0	8	8	0	0	0	. 8	0
1378 57	Ō	Ō	1 99593		i	Ō	0	0	0	0	0	0	0	
138461	0	0	2 00467			0	0	Ū	1	0	0		0	0
1338 14	8	(1)	9		0	0	0	0	1		0	0	A	0
1408 94	1	0	B	0	0		0	0	1	9	0	8	ß	1
1425 32		0	0	i	Î	<u> </u>	. 0	Ī	Ü	Ō	i	D	9	0
1438,14		0	0		Û	- 4	8	0	0	0	1	0	0	D
145002	0	G	0	9	0	1	0	0	0	0	0	- 1	D	
146285	0	0	0	2,00146	0	0	0	0	0	0	0	0	0	Q
147586	0	8	8	0	0	8	8	0	8	0	0	8	ß	8
147635		0	0	0	0	0	. 0	0	0	0	1	0	0	0

Fig. 69f

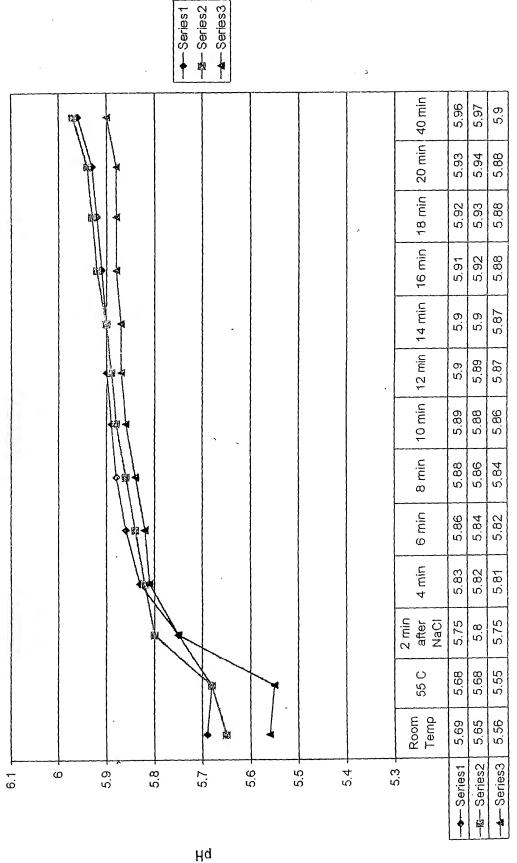








Bunsen Burner Only



F16. 749

F16. 74 b

10 min | 12 min | 14 min | 16 min | 18 min | 20 min | 40 min 6.16 6.14 6.11 8 min 6.08 6 min 6.04

ω

5.8

5.6

Hd

6.2

6.4

Na Lamp Only

一層-- Series2 -A-Series3

---Series1

F16. 74C

6.24 6.18 6.19

6.2

6.19 6.13 6.14

6.18 6.13 6.13

> 6.12 6.11

> 60.9 6.1

> > 90.9

6.04

6.02

6.09

90.9

6.04

6.03 6.02 5.97

5.93 5.91 5,9

5.63 5.61 5.51

5.65 5.64 5.56

- Series1

-A-Series3

4 min

2 min after NaCl

55 C

Room

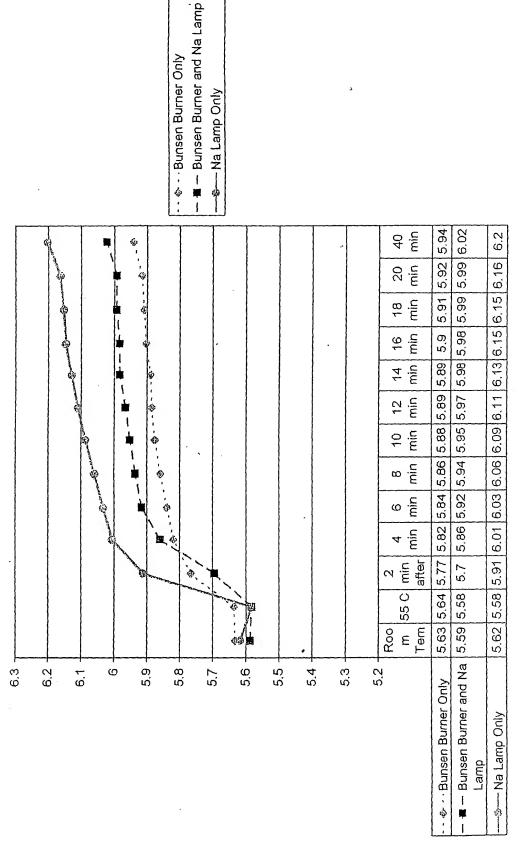
Ŋ

5.2

5.4

6.14 6.15

Averages of 3 Different Experimental Conditions

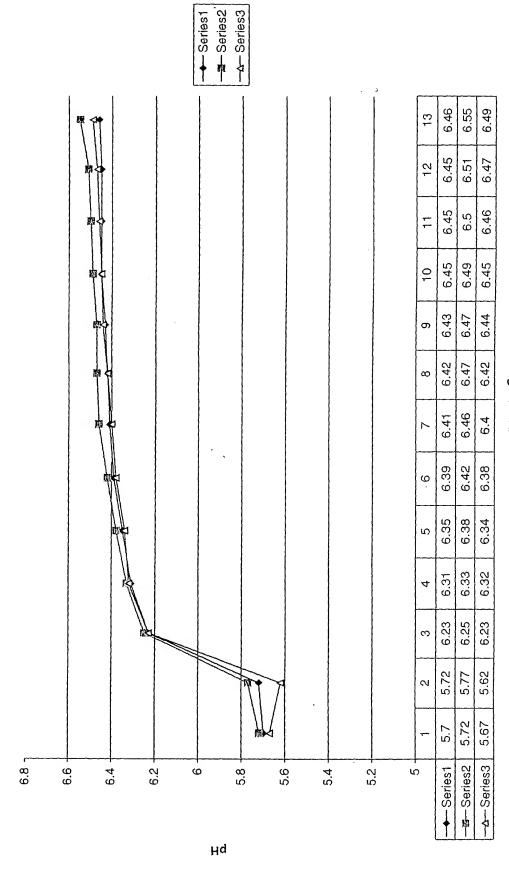


F16. 74 d

-A-Series3 -- a- Series2 --- Series1 10 min | 12 min | 14 min | 16 min | 18 min | 20 min | 40 min 6.34 6.28 6.25 6.28 6.27 6.28 6.25 6.24 6.24 6.23 6.27 Na Lamp - Conditioning and After NaCl 6.26 6.23 6.23 6.22 6.25 6.21 6.18 6.24 6.2 8 min 6.22 6.16 6.18 6 min 6.19 6.13 6.16 4 min 6.16 60.9 6.14 2 min after NaCl 60.9 6.08 9 55 C 5.72 5.67 5.66 Room Temp 5.69 5.71 5.7 6.4 -A-Series3 → Series1 6.2 5.8 5.5 5.6 5.4 φ Ηd

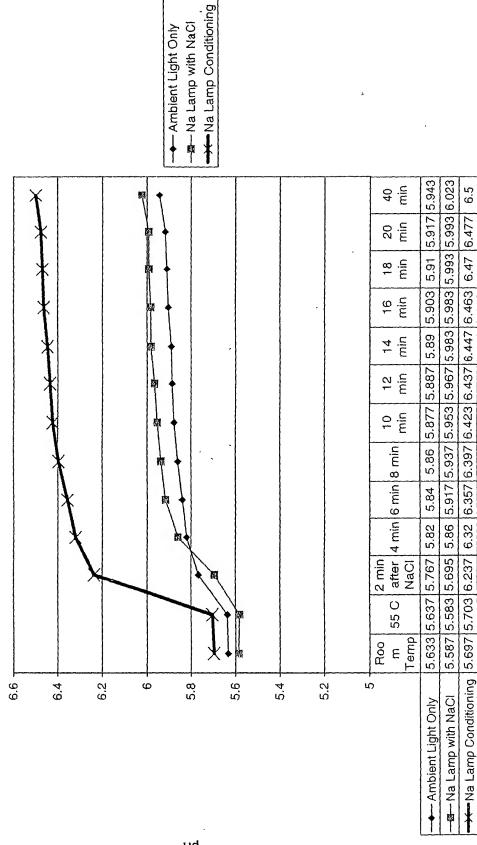
F16, 74e

Na Lamp Conditioning of Water

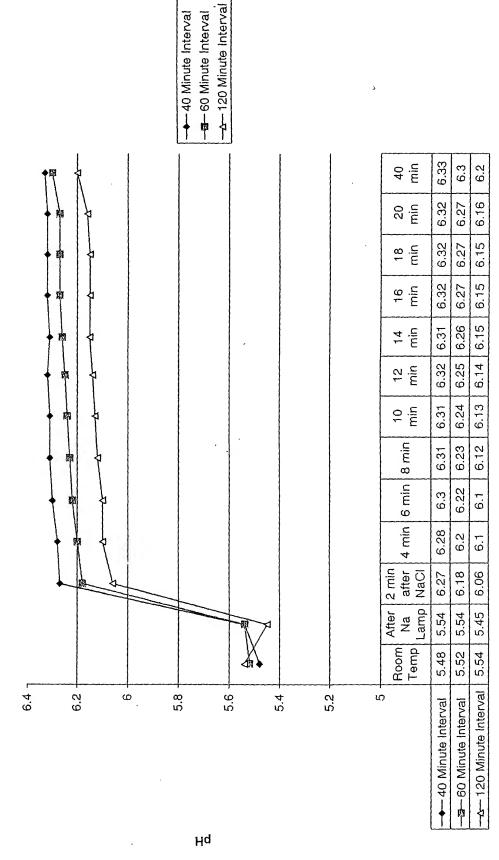


F16. 745

Averages of 3 Different Experimental Conditions

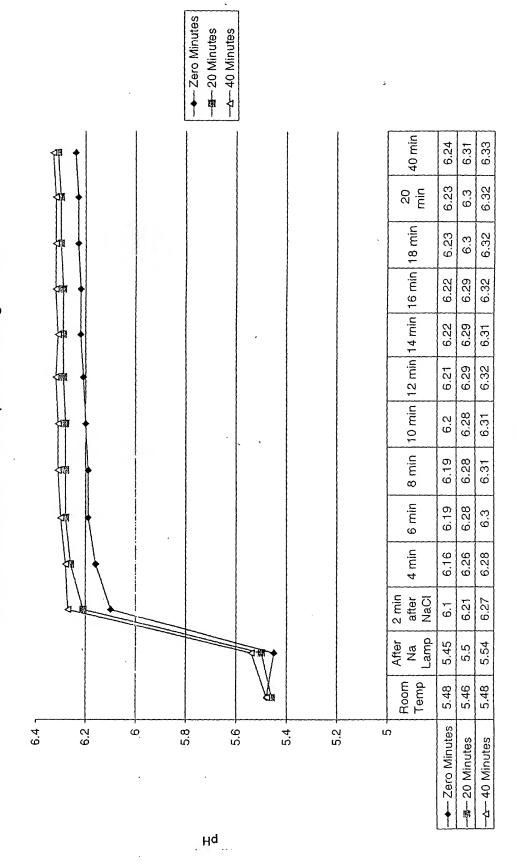


Decay Curves for Na Lamp Conditioning of Water



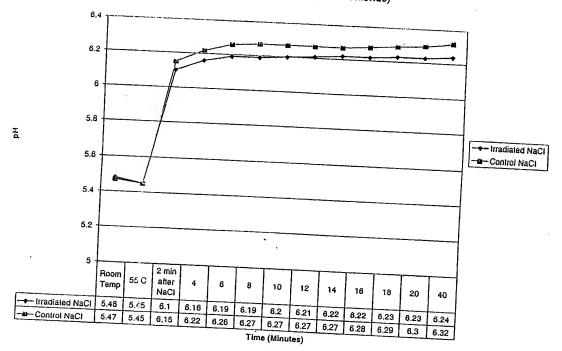
F16.

Activation Curves for Na Lamp Conditioning in Water



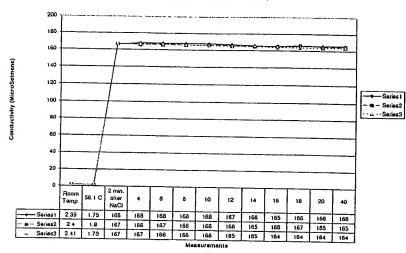
F16. 74'

Spectrally Irradiated Solute (Sodium Chloride)



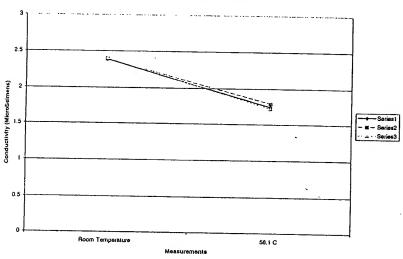
F16. 74j

1. Conductivity - Bunsen Burner Only



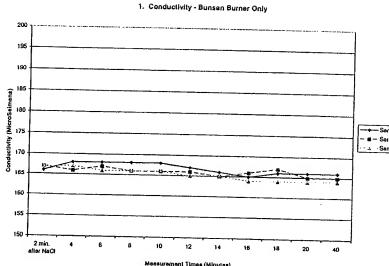
F16. 75a

1. Conductivity - Bunsen Burner Only

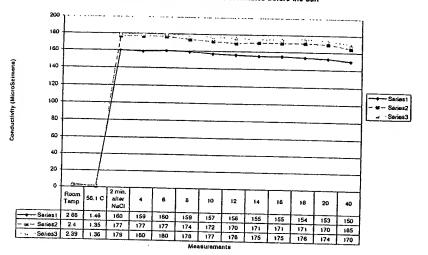


F16. 75 b

F16. 75c

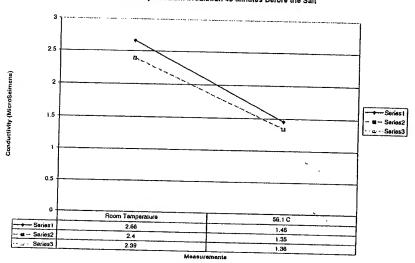


2. Conductivity - Sodium Irradiation 40 Minutes Before the Sait



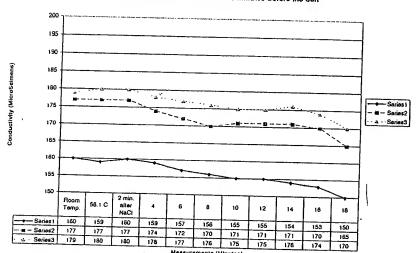
F16. 75 d

2. Conductivity - Sodium Irradiation 40 Minutes Before the Salt



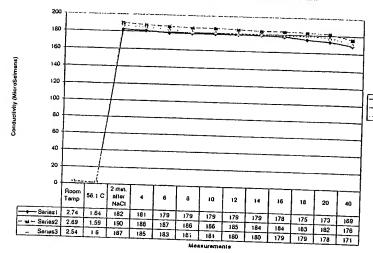
F16. 75 e

2. Conductivity - Sodium Irradiation 40 Minutes Before the Salt



F16. 75 f

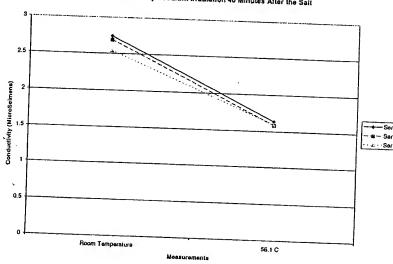
3. Conductivity - Sodium trradiation 40 Minutes After the Salt



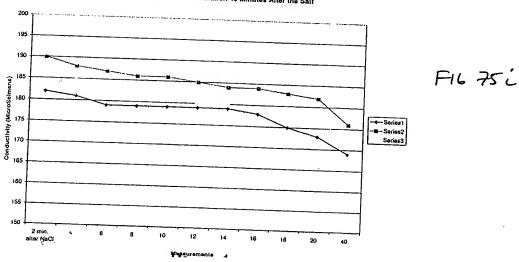
F16. 758

3. Conductivity - Sodium Irradiation 40 Minutes After the Sait

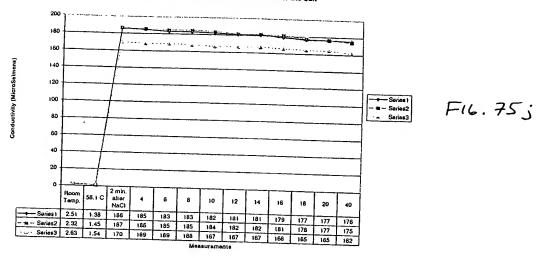
F16. 75 h



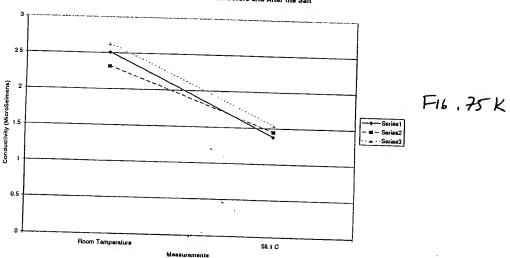
3. Conductivity - Sodium Irradiation 40 Minutes After the Salt



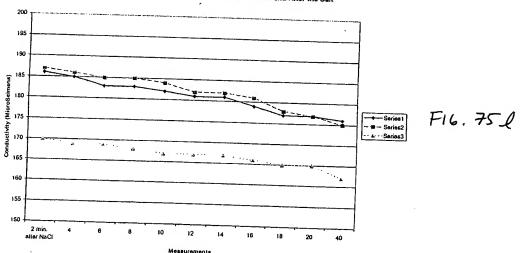
4. Conductivity - Sodium Irradiation Before and After the Salt



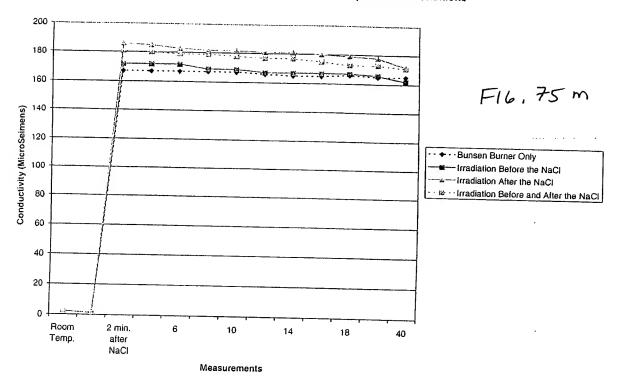
4. Conductivity - Sodium Irradiation Before and After the Sait



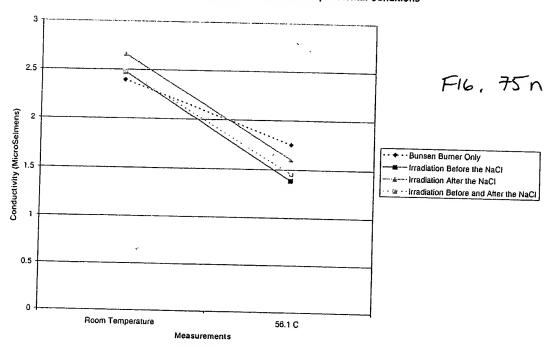
4. Conductivity - Sodium Irradiation 40 Minutes Before and After the Salt



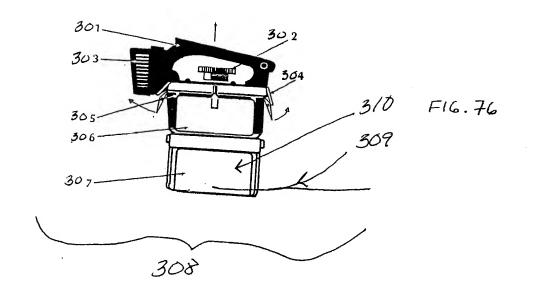
Conductivity - Averages of 4 Different Experimental Conditions

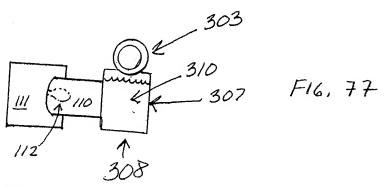


Conductivity - Averages of 4 Different Experimental Conditions

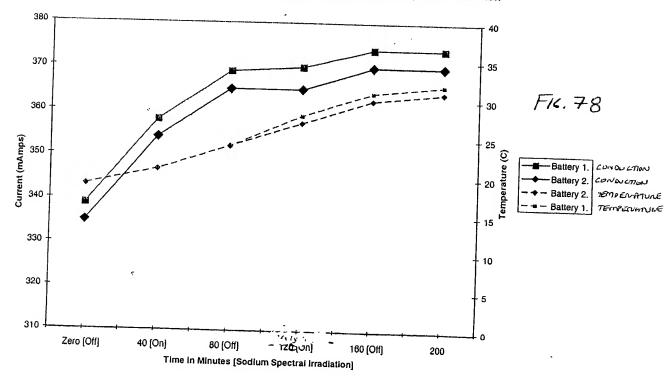


··寧··Irradiation Before and After the NaCl ----- Irradiation After the NaCl - - ◆ - · Bunsen Burner Only Conductivity - Averages of 4 Different Experimental Conditions 1 Measurements ∞ 2 min. after NaCl Conductivity (MicroSeimens)

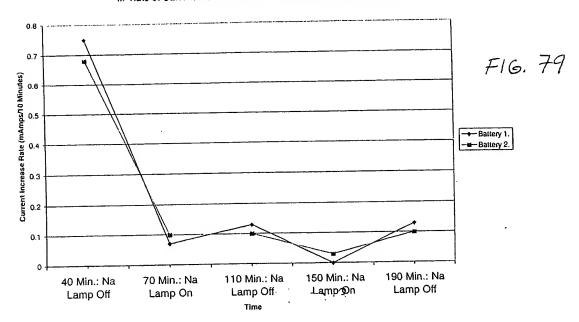


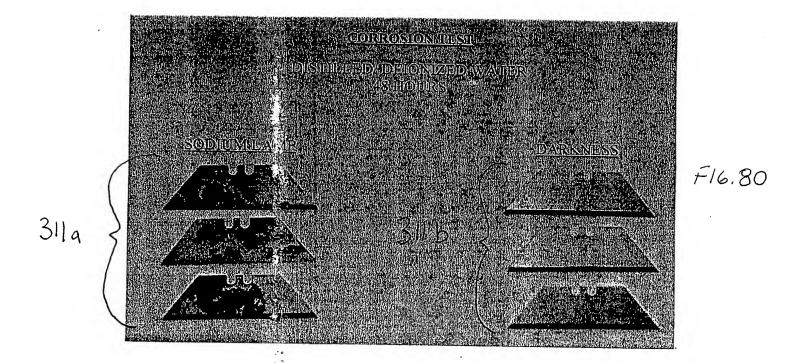


Enhancement of Sodium Chloride Electrolyte With Sodium Spectral Irradiation

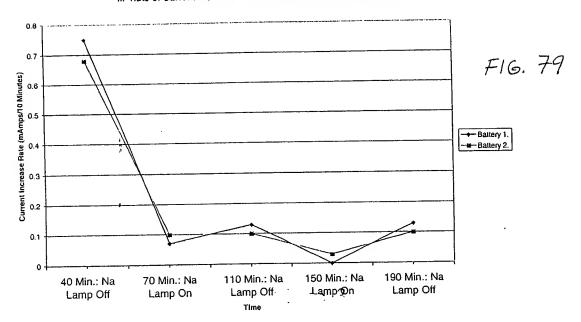


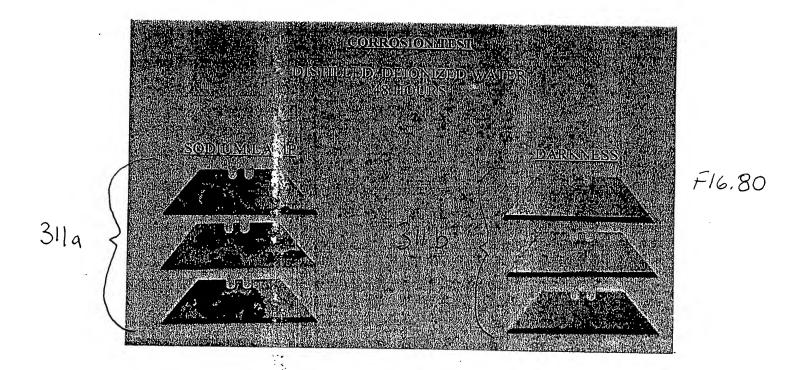
II. Rate of Current Increase in Sodium Chloride Electrolyte Battery

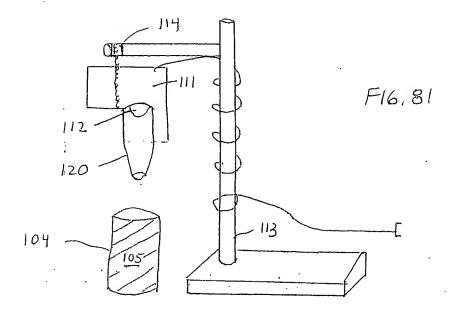




II. Rate of Current Increase in Sodium Chloride Electrolyte Battery

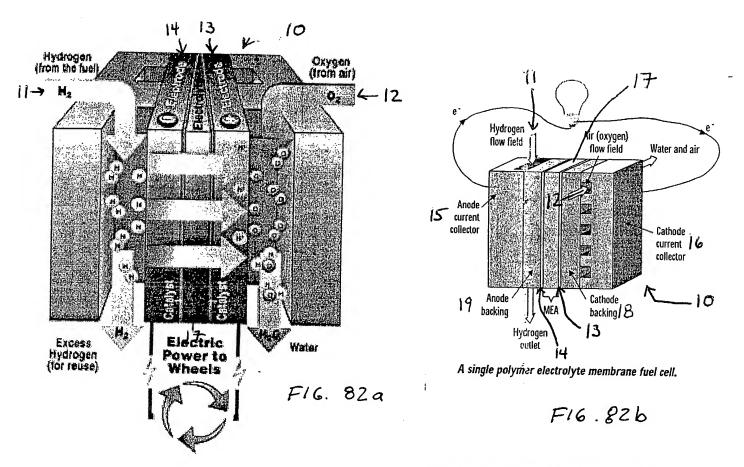


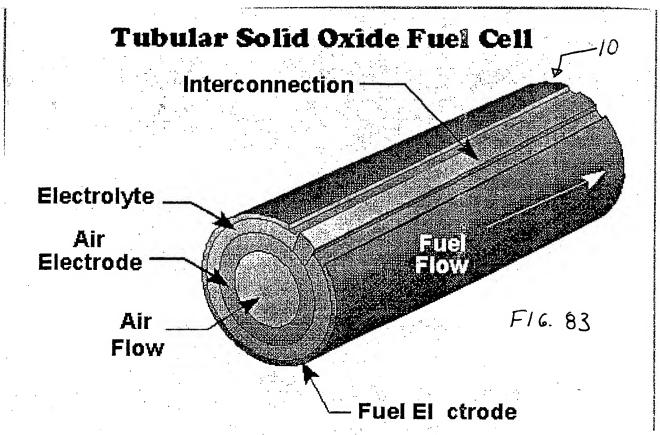




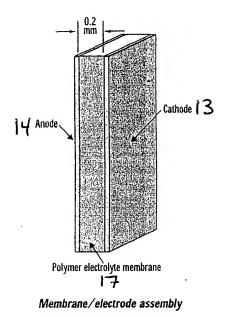
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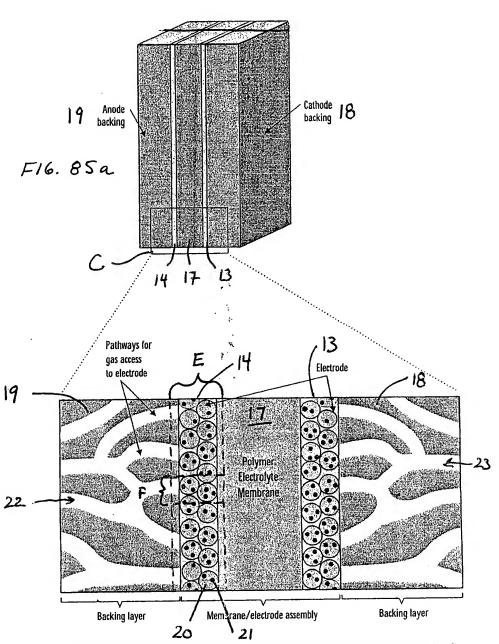




Membrane/electrode assembly with backing layers.

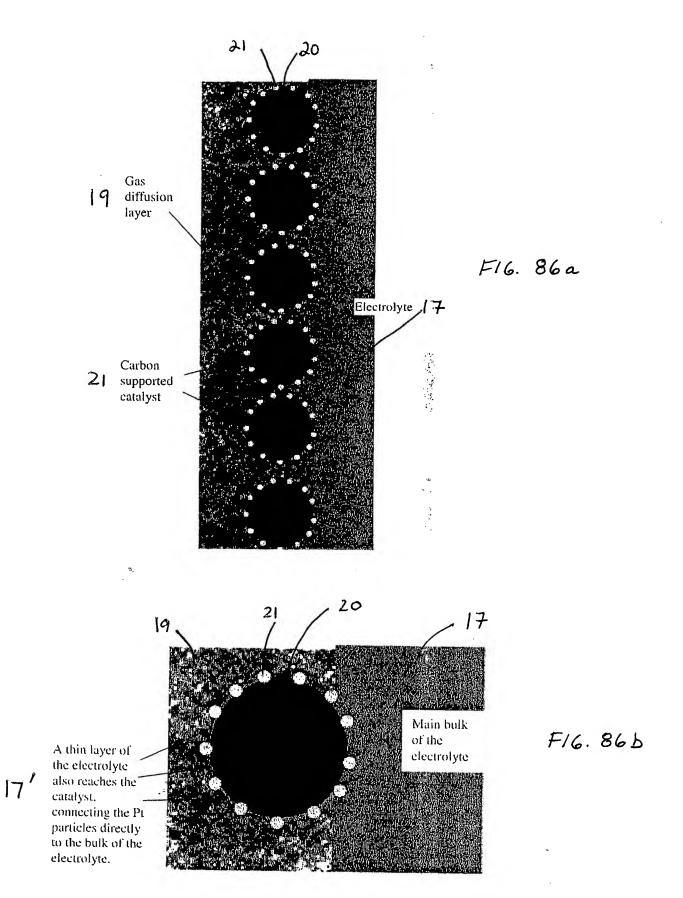


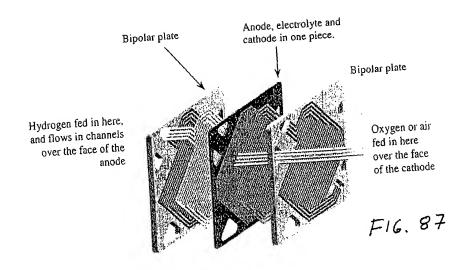
F16. 84

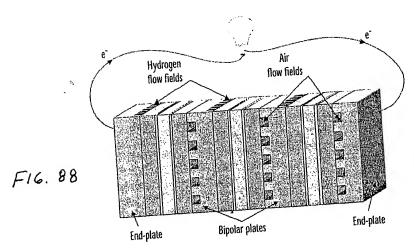


Enlarged cross-section of a membrane/electrode assembly showing structural details.

F16. 85 b







A 3 cell fuel cell stack with two bipolar plates and two end plates.